A.C. Kindig & Co.
ENVIRONMENTAL CONSULTING
65 Cottonwood Drive Wolf Creek
Winthrop, WA 98862
(425) 638-0358

November 4, 2009

City of Renton Planning Commission
1055 S. Grady Way
Renton, WA 98057

RE: Shoreline Master Program Update; Cedar River Reach 3; Old Stoneway Site

Dear Planning Commission Members:

I provided prior comments on various aspects of the July 22, 2009 draft City of Renton Shoreline Master Program (SMP) in writing and in oral testimony during both the SMP workshop on September 9, 2009 and the SMP public hearing on October 21, 2009.

This letter is my reply to the City's October 9, 2009 written response to written public comments on the July 22, 2009 draft SMP, specifically the City's response to my written testimony consisting of two documents: (1) my letter to the Planning Commission dated September 8, 2009 (which I submitted to the Commission during the September 9, 2009 workshop) and (2) the report submitted to you via City staff on September 11, 2009 entitled *Old Stoneway Site Standard Stream Report* (co-authored with my colleague, Carl Hadley).

Generally, I take exception to the City's responses to my September 8, 2009 letter and to our September 11, 2009 stream report, because most of those responses are simplistic replies to what are many complex technical issues and problems with some sections of the draft SMP that I addressed in my letter and that Carl Hadley and I addressed in our technical report. The City's replies missed or avoided many of the issues we brought to your attention.

Thank you for the opportunity to reply to the City's response comments. In this letter, there are two sections to my replies, in which I follow the City's matrix response to comments format. In that matrix, the City first characterized my letter and our report in one column, then addressed some aspects of the letter and our report with replies in another. Concerning my letter and our report, unlike most of the other City responses to comments, there is only one two-sentence characterization of the entire four-page letter and 10-page technical report, followed by one reply with seven numbered sections. (I italicize below the City's text.)

CITY CHARACTERIZATIONS OF THE AC KINDIG LETTER & STREAM REPORT

"This letter comments on ecological conditions based on
(1) The existing bulkhead along 79 percent of the river frontage is likely to remain in place.
(2) An evaluation of buffer function based on an a judgment as to the extent of enhancement appropriate
In addition, a report was submitted entitled "Old Stoneway Site Standard Stream Report, September 11, 2009"
See entire letter and accompanying report for full text."

MY REPLY TO EACH OF THE TWO CITY CHARACTERIZATIONS OF THE AC KINDIG LETTER & STREAM REPORT

My Reply to City Characterization 1

Characterization 1 is neither an accurate characterization nor an adequate list of the technical issues that I raised nor of the suggestions that we offered in the 14 combined pages of my September 8, 2009 letter and our stream report text.

My letter and our report specifically dealt with the existing functions and values for the Old Stoneway Site's shoreline, which necessarily includes the existing bulkhead. The letter and report also deal with methods to enhance the shoreline and bring public access to the shoreline, either or both of which are required under the SMP for a non-water-dependent use proposal.

The letter and report together illustrate that significant enhancement is possible with the existing bulkhead. Those two documents also assumed (correctly) that it was unnecessary to remove the existing bulkhead because it was not necessary to do so to mitigate impacts of any site redevelopment or to mitigate cumulative impacts of this site with future development.

The City's characterization fails to mention both (1) our assessment of buffer functions and how they perform at this site and (2) the linkage of my suggestions for SMP rephrasing to better deal in a City-wide way with sites that have the unusual suite of circumstances that the Old Stoneway Site has (i.e., a structural bulkhead necessary to deflect direct river current energy and the potential for some increase to net shoreline functions along the entire shoreline). My suggestions for sites with such circumstances should be reasonably provided for in the SMP.

My Reply to City Characterization 2

This is not a characterization at all, but simply references an entire technical report written in the City's preferred "Stream Report" format for assessing existing conditions as "attached".

CITY RESPONSES TO THE AC KINDIG LETTER & STREAM REPORT

No revision made.
The analysis is not relevant because:
(1) The existing bulkhead on the site will be required to be removed and replaced with shoreline protection, if needed, that complies with current standards by Section 8.04.02.A. which requires that new development be located and designed to avoid the need for future shoreline stabilization.
(2) The standard for development is of the site as provided in WAC 173-26-241(3)(d) "Master programs should prohibit nonwater-oriented commercial uses on the shoreline unless they meet the following criteria: (i) The use is part of a mixed-use project that includes water-dependent uses and provides a significant public benefit with respect to the Shoreline Management Act's objectives such as providing public access and ecological restoration..."
(3) The substitution of a different buffer for this reach than provided generally is Section 8.010.2 A-B simply substitutes a buffer which benefits one property, or group of properties, without specific reference to the general standard and is essentially "spot zoning".
(4) The 50 foot buffer is generally about half that which applies to other properties, and specifically the buffer provided for single family development in Subsection D.
(5) The 50 foot buffer proposed conflicts with the recommendation of AC Kindig for a 100 foot buffer for all streams under SMP jurisdiction in a Technical Memorandum prepared for the City of Renton Critical Areas regulations in 2003. See http://rentonwa.gov/uploadedFiles/Business/EDNSP/projects/science%20streams.pdf
(6) A 50 foot buffer would be less than the 100 foot buffer specified for Type 2 streams in RMC 4-4-50.L.5 and therefore would not meet the statutory standard in RCW 90.58.090(4) that the SMP provide a level of protection of critical areas at least equal to that provided by the local government's critical areas ordinances.
(7) Absent a specific development proposal, it is speculative to presume impacts of a development proposal and the adequacy of a specific buffer.

MY REPLY TO EACH OF THE CITY'S SEVEN RESPONSES TO THE AC KINDIG LETTER & STREAM REPORT

My Reply to City Response 1

The point of the combination of my letter and our stream report is to demonstrate that the bulkhead does not need to be removed in order to provide significant shoreline enhancement over the existing condition and to bring public access to the site. The issue in contention is whether it is necessary or appropriate to require "nonconforming" bulkheads to be removed or rebuilt during adjacent site redevelopment. The City Staff/consultant proposal for such a requirement is new to the City's SMP regulations. Our questioning some aspects of that City Staff/consultant-proposed new requirement regarding existing bulkheads does not make our comments irrelevant especially when the State's SMP Guidelines do not generally mandate that local SMPs require removal of existing bulkheads in connection with redevelopment of shoreline properties.

As I indicated in my public testimony, the bulkhead at this location was constructed to deflect energy of the Cedar River that, due to a bend in the river, is directly aimed at the Old Stoneway Site. Eliminating the bulkhead would expose the site to severe erosion and river migration. There is no doubt to those who have been to this location that some type of structural fortification is now and will be required if the site is to be developed at all. (For example, see the October 13, 2009 letter from civil engineer Jeff Johnson, P.E. of Northwest Hydraulic Consultants, which was submitted into the record by attorney David Halinen during the October 21, 2009 public hearing.) Note also that (a) waterward of the existing bulkhead along the Old Stoneway Site there are about 12 existing trees ranging between 8 inches and 18 inches in diameter (and many smaller trees) that would have to be removed in order to remove and replace the bulkhead and (b) due to Army Corps of Engineers' regulations, those large trees cannot be replaced. (See the November 3, 2009 letter from Carl Hadley.) Removal of those existing trees waterward of the existing bulkhead would more than offset any minor ecological gains that replacement of the existing bulkhead with a "conforming" shoreline protection and the lost function from these existing trees could not be mitigated.

Note that nothing in my letter or in our stream report suggests a site-specific handling of the Old Stoneway site in the SMP. Rather, my letter and our report are intended to support recommendations for generally applicable provisions in the SMP that would more appropriately deal with circumstances in the City like those existing circumstances on the Old Stoneway Site.

My Reply to City Response 2

Nowhere in my letter or our report is any type of development—water-oriented or not—speculated upon. Such speculation is not necessary in order to understand the technical issues being raised.

My Reply to City Response 3

The letter and report highlight a situation wherein adding more buffer offers no functional reward. Our suggestion is that the City address these types of situations in its SMP. This is important because the SMP seeks dual (and often conflicting) goals of bringing public access and water-oriented or water-dependent uses to the shoreline while also protecting or enhancing shoreline ecological functions. Our technical analysis shows that, for the Old Stoneway Site it is possible to significantly enhance shoreline function and provide for public access while leaving the existing bulkhead to protect the site from the direct erosive power of the Cedar River. Where a significant structural bulkhead exists, a buffer larger than about 50 feet offers no meaningful additional ecological function because of the intervening bulkhead.

Using these circumstances as a general model, we suggest that the City consider language that accommodates situations where some amount of the standard buffer is

not functional. Indeed, the City already does this where roadways, for example, extend into the buffer and therefore define the extent of the buffer, recognizing that extending the buffer over the roadway would add no more ecological function. To characterize this as "spot zoning" is untrue and misleading.

My Reply to City Response 4

The entire point of one portion of my September 8, 2009 letter (see page 3 of my letter) and of our report was to show that adding buffer beyond about 50 feet would not add more function where the bulkhead is deflecting the river's flow. This is true under existing conditions whether the standard buffer was 50 feet, 100 feet, or 1000 feet. The City's response sidesteps and avoids the real issue we raised. We made no suggestion that a 50-foot buffer width be applied to some properties and not others as the response would indicate—only that where circumstances like those on the Old Stoneway Site exist, language in the SMP ought to seek to recognize it for the portion(s) of the shoreline where the circumstance does occur (regardless of property boundaries). See reply to City Response 3, above.

My Reply to City Response 5

I was the lead consultant for the Best Available Science Review of Renton's streams, which also recommended standard buffers that the City is now employing. The issue here is simply that a 100-foot-wide buffer would not provide more shoreline ecological function than about a 50-foot-wide buffer would, due to site-specific circumstances of this particular property, where the river energy is deflected from the erosive site by the bulkhead. See my replies to City Responses 3 and 4, above. The City's mischaracterization of the issue as a violation of a standard buffer setback or as "spot zoning" is to avoid the technical issues, as well as to ignore the importance of the SMP objective to combine protection of shoreline functions with public access and use.

My Reply to City Response 6

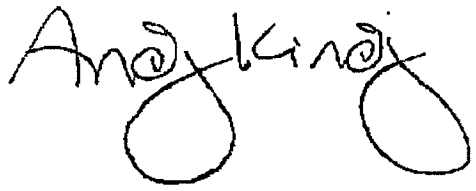
"Equal protection" in the context of Critical Areas Ordinances means in this case that shoreline functions are protected to their reasonable potential. It does not mean that a fixed distance can possibly define equal shoreline function for all circumstances. As described above in my replies to City Responses 3, 4, and 5, my letter and our stream report document a case where all possible shoreline ecological function under these circumstances will be met within about 50 feet instead of the standard 100 feet. Note that the City already allows further reductions in buffer for water-dependent or water-oriented uses. Certainly the City should allow for reductions where all reasonably possible shoreline ecological function can be maintained in a lesser distance. All reasonably possible function is certainly equivalent to the Critical Areas Ordinance's buffer intention.

My Reply to City Response 7

A specific development proposal is not necessary to explain how the bulkhead interacts with ecological riparian functions and the river, and our report explains the existing ecological functions with the bulkhead present. It is equally apparent that with any redevelopment proposal for the Old Stoneway Site, shoreline functions will be enhanced along the entire shoreline of the site, as explained in my September 8, 2009 letter. A specific proposal does not have to be made for that fact to be obvious, given the current industrial use of the site.

In overall sum, the City's response matrix has missed the key points of my letter and our technical report.

Sincerely,



Andrew C. Kindig, Ph.D.
Principal
A.C. Kindig & Co.

CEDAROCK CONSULTANTS, INC.
Environmental Consulting

November 4, 2009

City of Renton Planning Commission
1055 S. Grady Way
Renton, WA 98057

Re: Old Stoneway Site – Bulkhead Replacement Considerations

Dear Commission Members:

I understand that provisions of the City of Renton's October 9, 2009 draft Shoreline Management Program (Draft SMP) relating to future redevelopment of the Old Stoneway Site call for removal of the existing concrete bulkhead and may provide opportunity for replacement with shoreline protection that would comply with new standards set forth in Draft SMP Section 4-3-090.G.4 (a section that is generally the same as Section 8.04.02 of the City's July 22, 2009 draft SMP).[1] In the context of all development except single family development, Section 4-10-095.F.1 of the Draft SMP calls for existing bulkheads not meeting new City standards to be replaced if "moderate alteration" or "substantial alteration or redevelopment" is to occur anywhere in the shoreline of the site associated with a bulkhead. In regard to bulkhead removal and replacement, this letter summarizes expected physical implications, permitting issues, costs, and analysis of environmental effects that could reasonably be expected.

Physical Implications of Bulkhead Removal and Replacement

Removal of the entire bulkhead adjacent to the Old Stoneway Site would necessitate replacement with substitute shoreline protection to protect the site from the high erosion threat the Cedar River poses. As described by civil engineer Jeff Johnson, P.E. of Northwest Hydraulic Consultants[2], the Cedar River along the Old Stoneway Site is a high energy system and significant bank protection features will always be necessary to prevent the river from migrating into the site. The Draft SMP's recommendation of "bioengineering" as the preferred bank

[1] On page 18 of the October 9, 2009 City Staff/SMP consultant's Responses to Comments on the July 22, 2009 Draft SMP, item 1 of the City's response to David Halinen's 09-11-09 comment concerning Table 6.09 of the July 22, 2009 Draft SMP states:

> (1) The existing bulkhead on the site will be required to be removed and replaced with shoreline protection, if needed, that complies with current standards by Section 8.04.02.A, which requires that new development be located and designed to avoid the need for future shoreline stabilization."

[2] Northwest Hydraulic Consultants, 2009. Letter to AnMarCo from Jeff Johnson. Cedar River Site (Old Stoneway Site) – River Erosion Concerns. October 13, 2009. (A copy of that letter was submitted into the record of the Renton Planning Commission's SMP proceedings by AnMarCo's attorney David Halinen during the October 21, 2009 public hearing.)

protection measure would be completely inadequate in this situation to protect the site. As part of bulkhead replacement, the toe of the river bank would have to be changed from the current concrete bulkhead lined with large living trees, to a structural equivalent made of concrete and/or rock interspersed with anchored logs. The existing large, mature trees along the toe of the slope—trees that have high environmental value to the river—would have to be eliminated. New plantings could be added starting at the water's edge but they would be limited to those species allowed by the Army Corps of Engineers for use on floodwalls, levees and embankments[3]. Those species consist mainly of shrubs and small trees, which would have limited environmental value in contrast to the existing large, mature trees.

Permitting Involved with Bulkhead Removal and Replacement

Work below OHW would be necessary to remove and replace the bank protection that the existing bulkhead along most of the Old Stoneway Site's riverfront affords. This reconstruction would trigger a complicated permitting process involving local (City of Renton), state (Washington State Departments of Ecology and Fish & Wildlife) and federal (U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service) agencies.

The Army Corps regulates fill and excavation within wetlands and waterbodies under Section 404 of the Clean Water Act. Section 7 of the Endangered Species Act requires all federally authorized actions be reviewed to ensure they are not likely to jeopardize the continued existence of listed species. The NMFS and USFWS are also required to evaluate activities that are interrelated or interdependent with the proposed action. "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration. Not only would the federal agencies look at replacement of the existing bulkhead, they would also review all proposed development on the upland portion of the site, including land use types, traffic issues, and stormwater management design.

The federal agencies are under no constraints to operate within Renton SMP provisions. Permit-related conservation measures could include significant shoreline reconfiguration. The Corps, NMFS, and USFWS have in the past required project design measures that go beyond local jurisdiction's regulations. All of this would add a great deal of time and unpredictability to securing all necessary shoreline development approvals.

Local, state, and federal requirements for stream projects can vary significantly, which would complicate any project of the magnitude likely to be proposed in the future on the Old Stoneway Site. The time and effort required to coordinate and resolve conflicting requirements can be substantial. It is not unusual to spend 2 to 3 years on permitting an in-water project on a major salmon-bearing watercourse such as the Cedar River. Redevelopment project design, consulting and legal fees for such a protracted process would be very expensive.

[3] Army Corps of Engineers, 2000. Engineering and design guidelines for landscape planting and vegetation management at floodwalls, levees, and embankment dams. EM-1110-2-301.

In-water construction on a major river is difficult and costly. I have been involved with three high bank repair and replacement projects involving in-water work in the last few years. My experience with these projects has been that construction costs run between $1,000 and $1,500 per linear foot. Given the 1,170-foot-long reach of the Old Stoneway Site's bulkheaded shoreline, construction costs to replace this particular bulkhead would probably range between around $1,200,000 and $1,750,000.

Environmental Effects of Bulkhead Removal and Replacement

In general, riparian buffers perform many functions essential to fish survival and productivity. Vegetation in riparian areas can shade streams and helps maintain cool water temperatures. Plant roots stabilize stream banks and help control erosion and sedimentation. Streambank erosion provides a source of coarse sediment essential to the creation of spawning habitat and invertebrate production. Riparian plants contribute leaves, twigs, and insects to streams, thereby providing basic food and nutrients that support fish and aquatic wildlife. Riparian vegetation, duff layers, and soils filter incoming sediments and pollutants thereby assisting in the maintenance of high water quality needed for healthy fish populations. An intact riparian zone moderates stream volumes by reducing peak flows during flooding periods and by storing and slowly releasing water into streams during low flows (Knutson and Naef 1997).

Under natural undisturbed conditions, the value of a riparian corridor to fish and other aquatic species varies spatially and over time. Not all natural stream banks permanently provide the entire suite of potential riparian buffer functions. There are many examples of naturally armored banks in the Cedar River where bedrock outcroppings result in stable banks with low sediment recruitment rates and poor vegetative conditions. Conversely, sand and gravel terraces often provide a good source of sediment and leaf litter, but are rarely stable enough over the long term to provide good large woody debris recruitment sources.

Not all natural functions of a riparian buffer are suitable or even desirable in an urban condition. Dense riparian vegetation tends to preclude human access, a mandated goal of the SMP. Large woody debris recruitment is normally discouraged in urban settings due to the inherent hazards to human life and property when large trees are left to fall during storms. Much of the natural buffer functions for hydrologic and water quality functions (peak flow attenuation, base flow releases, and water quality treatment) are removed from riparian buffer control by storm drain systems. Storm water detention and water quality treatment requirements are regulated for new development and redevelopment within the City without reliance on riparian buffer function.

The goal of an effective and appropriate shoreline management program in an intense urban setting like that of the Renton Draft SMP's Shoreline High Intensity Overlay District should be to maximize riparian functions where reasonable and to the extent practicable given site specific considerations. A shoreline management program should not attempt to maximize all riparian functions at every location along a stream or lakefront. Given the unique situation found at the Old Stoneway Site, it is not reasonable to think that a significant ecological benefit could be achieved by requiring the existing bulkhead to be replaced. As mentioned previously, a structural shoreline stabilization method is necessary at this location due to the high level of hydraulic energy of the Cedar River during high flow events and the position of the site along the

outside of a bend in the river. Due to the value both of the Old Stoneway Site and of nearby public improvements (i.e., the Maple Valley Highway and the Cedar River Park) that are being protected by the existing bulkhead, the shoreline cannot be allowed to retreat naturally and provide a future source of coarse sediment. Bank armoring of the shoreline toe is necessary and would have to consist of structurally stable material such as rock or concrete. While large logs could be added to the toe for environmental benefit, logs do not provide a long-term structural stability component.

While a few riparian functions along a replacement bulkhead at the Old Stoneway Site could be minimally enhanced, the effect of bulkhead removal and replacement would cause other riparian functions to be degraded. Bulkhead removal and replacement could (a) allow new plantings at a variety of elevations along the site's riverfront rather than plantings only at the top and toe of the bulkhead as would likely occur with redevelopment of the site, and (b) alter the river's hydraulic effects on sediment recruitment and transport in some unknown way. However, removal and replacement of the existing bulkhead would sacrifice a minimum of a dozen existing large trees and a well-established willow/salmonberry shrub mix along the river's edge. The existing trees, which include some large (greater than 18-inch diameter) cottonwoods, could not be replaced in the future due to Army Corps' limitations on planting of vegetation. Alternatively, if the existing bulkhead is retained in conjunction with future redevelopment of the Old Stoneway Site, those existing trees and shrubs could be saved and new plantings could be added along the top of the existing bulkhead to enhance ecological benefits.

Conclusions

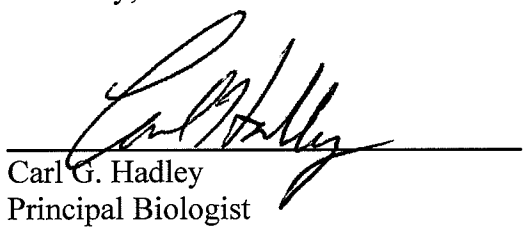
In my opinion, it is unreasonable to think a significant ecological benefit to the Cedar River at this location (if any benefit at all) could be achieved by replacing the bulkhead with a protective structure designed to provide an equivalent level of shoreline protection. The generic environmental justification cited in the Draft SMP as support to require bulkhead replacement is contradicted by site specific facts at the Old Stoneway Site. The replacement structure would alter instream flow patterns but would do little, if anything, to enhance riparian functions, alter sediment recruitment, improve water quality protection, add to salmon habitat, or support other benefits hypothesized in the Draft SMP. Moreover, the replacement bulkhead would come at the environmental expense of the loss of at least a dozen large trees as well as existing shrubs currently growing along the water's edge.

In addition to the above-noted high construction cost of bulkhead removal and replacement, the long extra approval time periods and additional site redevelopment constraints associated with permits issued by the Federal agencies (the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service) and Ecology in conjunction with bulkhead replacement work could render a future proposed redevelopment of the Old Stoneway Site infeasible.

While improvement of salmon habitat is a worthy goal, the costs and benefits of restoration ought to be considered when establishing regulations. In my view, the potential environmental benefit (if any) of bulkhead replacement at the Old Stoneway Site would be low, and the costs associated with completing the work would be very high. Thus, I conclude that regulations in

the proposed SMP that would mandate removal of the Old Stoneway Site's bulkhead in conjunction with future redevelopment of the site are not a sensible approach to the City's goal of salmon habitat restoration.

Sincerely,



Carl G. Hadley
Principal Biologist
Cedarock Consultants, Inc.

16300 Christensen Rd., Ste. 350 | Seattle, WA 98188 | 206.241.6000 | www.nhcweb.com

nhc
northwest hydraulic consultants

October 13, 2009

AnMarCo
Attn: Don Merlino, Partner
9125 10th Avenue South
Seattle, WA 98108

Re: Cedar River Site (Old Stoneway Site) – River Erosion Concerns

Dear Mr. Merlino:

On October 9, 2009 I met with you at the project site to discuss the stability of the north bank of the Cedar River along your construction yard that is located east of Interstate 405 and fronts the Maple Valley Highway. The site is identified in the aerial photograph on the next page. The south edge of the property borders the Cedar River and is currently protected from the river by a concrete bulkhead which extends along roughly the east four-fifths of the property's river frontage.

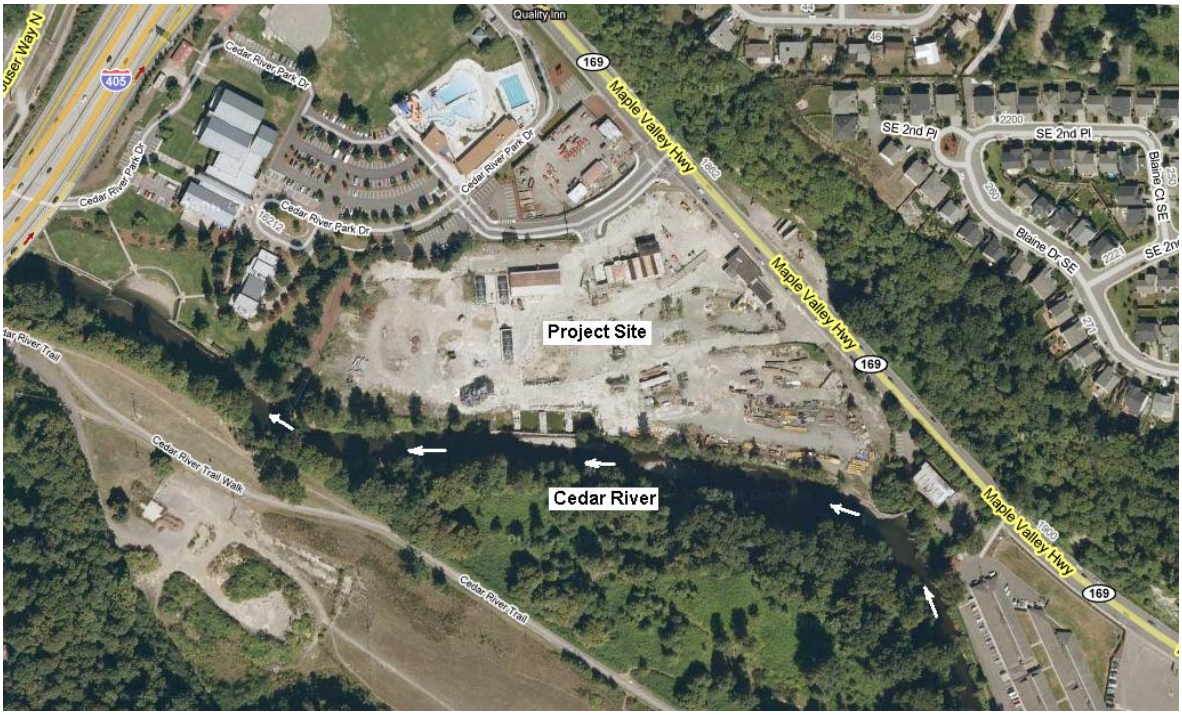
Based upon discussions with you and your attorney, Mr. David Halinen, it is my understanding that if you were to redevelop the property under the draft Shoreline Master Program regulations that the City of Renton is considering, you may be required to remove the existing bulkhead. I recommend that you proceed with caution if you consider alternative bank protection systems or changes to the bulkhead. The Cedar River along the property is a high energy system and, therefore, significant bank protection features are essential to prevent the river from migrating into the project site.

To some, the bulkhead may be aesthetically unappealing and may be considered undesirable for habitat. However, the bottom line is that a stout and robust bank protection system must be maintained to protect the people and infrastructure that will eventually occupy the site. The bulkhead is one alternative and with proper maintenance should continue to protect the bank for decades. Other alternatives can be developed, but they all will require significant rigid works and will be very expensive to construct.

If you have any questions regarding the options described in this letter, please call me.

Very truly yours,
Northwest Hydraulic Consultants

Jeff P. Johnson, P.E.
Principal



Location Map

nhc
northwest
hydraulic
consultants

JEFF P. JOHNSON, P.E

Principal River Engineer

Education

M.S., Civil Engineering, Washington State University

B.Sc. in Civil Engineering, Washington State University

License/Affiliations

Registered Professional Engineer, WA, OR, ID, AK

Member, American Society of Civil Engineers (ASCE)

Member, Association of State Floodplain Managers

Member, Northwest Floodplain Management Association

Years Experience

24

Areas of Expertise

Responsible for more than **50** detailed FEMA mapping studies

Recognized expert in flood protection alternative development and has been or is involved in most large scale flood protection projects in western Washington, including current projects on the Nooksack, Skagit, Puyallup and Chehalis Rivers

Led or participated in the design of over **30** channel stabilization, bank protection, and habitat restoration projects

Played a leading role in the design of over **20** fish passage culverts

Completed scour evaluations on over **400** bridges

Completed over **50** bridge hydraulic studies for new or replacement bridges

Mr. Johnson, a principal with **nhc**, is a respected river engineering and floodplain management specialist. He has been employed by **nhc** for 22 years. He is a recognized expert skilled at helping local, state, and federal agencies as well as private clients address challenging geomorphic, sediment transport, and hydraulic design issues associated with bridges and culverts, bank erosion, stream restoration, and flood hazard safety. He is an expert in floodplain mapping, flood damage impact assessment, and flood protection planning and design. He is **nhc**'s principal engineer responsible for the firm's long standing on-call contract with FEMA Region X. Mr. Johnson frequently provides expert testimony and has excellent communication and interpersonal skills. He is the manager of **nhc**'s Seattle office which employees approximately 30.

Selected Project Experience

McKenzie River Bank Protection Stability Evaluation: Project manager and lead technical expert responsible for evaluating the condition of existing bank protection features along a 2000 foot reach of the McKenzie River adjacent to a large floodplain gravel mine. Project included detailed land and bathymetric surveys, comprehensive field inspection, geomorphic assessment, hydrology, and hydraulics. Mr. Johnson identified vulnerable sections of the bank and evaluated the potential for the river to capture the existing floodplain mine. He is currently developing alternatives to upgrade the bank protection.

Bridge Replacement Studies. Mr. Johnson has completed numerous bridge replacement investigations. He typically serves as senior project engineer responsible for estimating design flood water levels, assessing hydraulic impacts, evaluating scour potential at proposed piers and abutments, examining river planform stability, and recommending channel stabilization and bridge protection features.

Bridge Scour Evaluations (State and Federal). Project engineer and manager responsible for evaluating scour potential at more than 300 FHWA, WSDOT, and ODOT bridges. Evaluations include procedures recommended in the latest FHWA HEC-18 document "Evaluating Scour at Bridges," but most important are supplemented by years of experience working with transportation officials to provide realistic assessments and to develop practical solutions.

Hoh River River Emergency Bank Protection: Principal engineer responsible for assisting County engineers in developing a plan to stabilize an eroding bank that was threatening the safety of the Upper Hoh Road at River Mile 4.0. Project Built November 2006.

Culvert Fish Passage Design. Project manager responsible for designing numerous culvert replacements to provide fish passage at barrier crossings.

Stream Bed and Bank Stabilization at Bridges. Mr. Johnson has developed designs to slow or halt active lateral stream bank erosion and/or channel degradation at numerous bridge sites. Solutions have ranged from conventional riprap techniques to innovative biotechnical methods to provide an environmentally acceptable solution and improved fish habitat.